Application of a Probabilistic Sampling Design on a National Level: EPA's National Fish Tissue Study

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Leanne Stahl is an environmental scientist in the Office of Science and Technology within the U.S. Environmental Protection Agency's Office of Water with training and experience as a fisheries biologist. Since 1999, she has served as the project manager of the National Study of Chemical Residues in Lake Fish Tissue, moving the project from its planning phase into full implementation. Leanne moved to EPA's Office of Water from the National Oceanic and Atmospheric Administration in 1990 and has worked in a variety of water programs over the last 12 years.

Blaine Snyder is employed as a principal scientist and project manager at the Baltimore, Maryland office of Tetra Tech, Inc. He is an American Fisheries Society Certified Fisheries Scientist, specializing in the design, implementation and interpretation of environmental impact assessments and aquatic ecological investigations. Mr. Snyder has been involved with the National Study of Chemical Residues in Lake Fish Tissue since the preliminary planning stages, and currently serves as the study's National Sampling Support Manager. Together with coauthors Amanda Richardson and Jennifer Pitt, he has supported the U. S. EPA in the development of the study design, quality assurance plan, and sampling methods, and continues to coordinate all national sample collection activities.

Abstract

The U.S. Environmental Protection Agency is conducting a screening-level study to estimate the national distribution of selected persistent, bioaccumulative and toxic (PBT) chemical residues in fish tissue from lakes and reservoirs of the continental United States. This four-year study will define national background levels for 265 chemicals in fish, establish a baseline to track progress in pollution control activities, and identify areas where contaminant levels are high enough to warrant further investigation.

The National Study of Chemical Residues in Lake Fish Tissue (or National Fish Tissue Study) is important because it is the first national fish tissue survey to be based on a random sampling design, which will allow EPA to develop national estimates of the mean levels of PBT chemicals in fish tissue. The target population was the estimated 260,000 lakes and reservoirs of the continental United States, and River Reach File Version 3 was used to generate the list of lakes in the target population. All lakes were stratified by size into 6 size categories with varying inclusion probabilities, to decrease the extent to which small lakes dominate the sample. A random subsample of candidate lakes was selected for study. A critical element of the statistical survey design was the determination of the status of each lake in the sample. For this study, a lake was defined as a permanent body of water of at least 1 hectare in surface area with: a minimum of 1,000 m^2 of open (unvegetated) water; a depth of at least 1 meter; and a permanent fish population. The reconnaissance process involved both desktop and ground truth exercises, to provide or verify site information throughout the country. Equally important to the nationwide collection of lake reconnaissance information was the orientation and training of study participants throughout the country. Sampling teams are currently applying consistent methods nationwide, to collect fish tissue from a total of 500 randomly-selected lakes (i.e., 80-90 lakes in each size of the 6 size categories) during the course of the 4-year period of study.